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How Plants Can Make Stormwater Cleaner | College of Engineering

11/18/2015

Ever wondered what happens to the surge of stormwater you see racing down your street?



"Malgorzata Ryciewicz-Borecki and Andrew Lewis prepare a soil sample at the bio-retention site constructed for stormwater quality research. The team is working to determine if plants can play a more active role in remediating heavy metal buildup in stormwater retention areas."

In cities across the West, precipitation is collected in urban centers by gutters and drains, channeled outside city limits and, in some cases, piped into irrigation canals or natural waterways. This system has been around for decades, but it's under increasing scrutiny in light of new research that shows stormwater in urban areas carries harmful pollutants to downstream rivers and lakes.

Researchers in the College of Engineering and Utah Water Research Lab are working to change that. Margie Ryciewicz-Borecki, a Ph.D. candidate in the department of Civil and Environmental Engineering, is approaching the issue with a unique perspective thanks to her background in landscape architecture. She and her adviser, Dr. Ryan Dupont, are wrapping up a long-term study on how vegetation can be used to remove heavy metals and unwanted nutrients from stormwater.

"More and more, we're realizing that stormwater pollution is a big deal," she said. "We know that vegetation improves stormwater quality. Now we're asking if the species of plant makes a difference and if so, how much?"



"Professor Ryan Dupont, Ph.D., clips vegetation from a test bay at a stormwater research site. Dupont is overseeing a research study that could unveil new information about low-cost phytoremediation."

To test the theory, she and her colleagues built a test site where runoff from a nearby subdivision is collected in a retention system that's divided into 24 treatment bays. The bays were planted with one of three species commonly found in stormwater bio-retention systems – cattail, sedge and sunflower.

Experts know the plants can remove metals and nutrients from the soil, but they want to know if adding citric acid to the bays stimulates the plants to take up even more. Citric acid increases metal solubility and facilitates uptake by the plants.



“Student Darianne Willey, front, clips vegetation with Ph.D. candidate Margie Rycewicz-Borecki. The team is working to determine if plants can play a more active role in remediating heavy metal buildup in stormwater retention areas.”

After the treatment cells were planted, researchers went back twice a year to harvest the vegetation and analyze it at the Water Lab. Sunflower was found to be good at taking up zinc and copper; while sedges were effective at taking up phosphorus and nitrogen. Dupont says the results will demonstrate that using this enhanced method of phytoextraction can increase metal uptake by plants, which can then be harvested and removed from the site.

“With the application of this low-tech, plant-based treatment approach,” he explained, “the surge of stormwater generated from storms in our urban environments can safely be released back to the environment free of hazardous metals and polluting nutrients in a low-cost, environmentally sustainable way.”

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